after an interval long enough to allow output to overtake and exceed consumption. But since changes in the supply of agricultural raw materials, which in this case are the governors of the entire process, are usually not correlated with the state of business, stocks of finished goods made from such materials behave irregularly during business cycles.

III

By way of conclusion, I should like to develop very briefly a few implications of these observations and of the theory of inventory fluctuations to which they point.

As already stated, the total stocks of business men can be divided into numerous significant categories. The cyclical behavior of these categories reflects differences in the motives behind inventory policy and in the ability of business men—for reasons of technique, market organization, or contractual arrangements—to implement their policies. The validity of this view is, I think, demonstrated in the case of manufacturers' stocks. Here the observed lag of total inventories behind output is to be explained as the net resultant of the disparate behavior of at least seven classes of stocks: (1) goods in process, which vary together with output; (2) raw materials purchased from domestic manufacturers or dealers, which lag by, say, two or three months; (3) raw materials purchased from distant sources or on long-term contracts, which lag behind output by many months; (4) finished goods made to order which, like goods in process, are closely tied to output; (5) perishable finished goods sold from stock, which probably lag behind output by a few months; (6) staple finished goods made to stock, which vary inversely with output in short cycle phases and positively with a long lag in long phases; (7) agricultural raw materials and finished goods made from such materials, which, under certain conditions, inject an irregular element into the movements of manufacturers' stocks.

The need to distinguish numerous classes of stocks, moreover, is not confined to manufacturers' inventories. Aggregate inventories of wholesalers and retailers also appear to have

lagged behind sales by about six months, and I am confident that close study will reveal that the lag of total distributors' stocks reflects great differences in the ability of merchants in different trades to keep the rate at which they receive goods in line with the rate at which they can dispose of them. It must be expected, therefore, that the ability of some merchants to adjust stocks to sales is so limited as to produce a long lag of stocks behind sales or even an inverse relation between sales and inventories.

From these general considerations, several important inferences may be drawn. The first is that no simple, general explanation of inventory fluctuations is valid. An adequate theory of inventory cycles must explain the disparate behavior of the several categories of stocks that move in significantly different ways.

A second inference is that if we are to put our knowledge of inventory cycles into fully quantitative form by the construction and empirical evaluation of a mathematical model, the results are likely to be more valid if the model takes into account subdivisions of aggregate stocks distinguished by industry and type. The point is, of course, obvious in a general way, but its importance may perhaps be heightened by considering some of the ways in which its neglect can cause difficulties. For example, raw materials, goods in process, and finished goods vary with output in distinctly different ways, but their importance is not the same in each industry. Shifts in the distribution of demand among industries, such as ordinarily accompany business cycles and occur also independently of cycles, must tend, therefore, to alter the relation between total inventories and output. In the same way, stocks of finished goods made to order and finished goods made to stock behave in radically different fashion. Changes in the distribution of demand or in marketing practices will also tend to modify the importance of these categories and thus to complicate the relation between aggregate stocks and output. Again, the behavior of staple finished goods made to stock depends upon the length of the cycle. Such stocks vary inversely with output during short expansions or contractions, but they tend to vary

directly with output in the last stages of long movements. This in turn must tend to make the relation between aggregate stocks and output a variable. Under the circumstances it is likely to be more fruitful to try to take account of the shifting relation between stocks and output by studying each significant category of stocks in each important industry group separately and by combining the results in an appropriate way than by attempting to discover a single rule that expresses directly the changing relation between total stocks and total output.

Still a third general inference concerns our understanding of cycles in inventory investment as distinct from cycles in stocks themselves. As noted above, aggregate inventory investment tends to turn near the turns of output and to lag behind the peaks and troughs in the rate of change in output. An explanation of this behavior is, of course, more complicated than an explanation of the relation between cycles in the level of stocks and in the level of output. It is clear, however, that differences in the desire and ability of businessmen to keep stocks in line with output are necessary, if not sufficient, elements of a theory of inventory investment cycles. One may, for example, observe the same sort of contrasts in the cyclical behavior of investment in stocks of different types as were shown above to be characteristic of cycles in the volume of stocks. The peaks of investment in stocks of raw materials whose supply cannot be adjusted promptly to changes in demand occur much later in the cycle than the peaks of investment in stocks of materials whose supplies are easily adjusted. And the same is true of investment in stocks of finished staples, for in this case the desire of manufacturers to keep stocks in line with output is diluted by conflicting pressures.

It follows from these suggestions that the lag of inventory investment behind the rate of change in output is determined by a complex combination of conditions affecting different inventory categories. Hence a simple application of the acceleration principle to the movements of stocks is far from satisfactory. This apparent difficulty with a common element of cycle theory, however, facilitates, rather than complicates, an interpretation of the course of business cycles. For, as indicated

above, there is good evidence that the rate of growth of output usually begins to decline long before business reaches a peak. If the volume of inventory investment were closely tied to the rate of change in output, as at least a simple formulation of the acceleration principle suggests, we should expect inventory investment also to decline early in expansion. But since inventory investment is a major element of capital expenditures, it must influence the timing of peaks in output and incomes. Hence if inventory investment actually did move synchronously with the rate of change of output, it would be difficult to account for the considerable interval that, in fact, usually intervenes between the peak in the rate of growth of output and the peak of the business cycle itself. At least part of the explanation for the existence of this interval lies in the absence of any close temporal connection between the rate of change in output and in total inventory investment. The continued growth of inventory investment after the rate of change in output begins to decline helps employment and output to continue their expansion. With some modifications, this hypothesis applies also to contractions.

The explanation of cycles in manufacturers' stocks can be used to throw light also on the connection between businessmen's plans and the observed movements of stocks. Of course, unambiguous causal significance can be attributed to inventory investment as an explanation of output changes only to the degree that the investment observed was planned or intended by the businessmen concerned. It is obvious also that we have no objective way of separating planned from unplanned changes in stocks. Implications with respect to intentions are, however, imbedded in the theory of cycles in manufacturers' stocks advanced above. One clear example is implied by the hypothesis that business men do not foresee turns in demand and consequently do not reduce orders for materials or curtail their output until after their own sales have begun to decline. The inference is that the rise in stocks of raw materials and finished goods immediately after a downturn of business is largely unplanned. The declines in stocks that follow upon the heels of upturns in business are, on this hypothesis, similarly fortuitous.

If this interpretation is correct, poor forecasting, which results in unintended inventory investment after business peaks, and disinvestment after troughs, makes these business reversals less sharp than they would otherwise be. It also seems likely, although it is by no means certain, that businessmen attempt later to wipe out the inventory surpluses or deficits thus created and that this intensifies the subsequent swings, whether of expansion or contraction.

One final implication of this analysis concerns the information required for the further development of inventory research. The character of the theory I have been discussing emphasizes the importance of augmenting the detail in which inventory information is reported. In the field of manufacturing, for example, the Department of Commerce now reports monthly the current book value of total inventories held by all manufacturers and by each of eleven industries. These series, which begin with December 1938, have added enormously to our current information about stocks. When their time-coverage becomes sufficiently long, they will prove to be of great benefit to business-cycle studies also. Our analysis suggests that an additional division distinguishing raw materials, goods in process and finished goods is of first-rate importance. Almost equally vital is information enabling us to distinguish between inventories of finished goods made to order and to stock, and between durable, staple, and perishable finished goods. These supplements to our statistics, however, will not yield their full benefits until we are in a position to allow more adequately for the effect of price changes upon book values. Broadly speaking, we need additional information of two sorts: more knowledge about current practices in accounting for inventories and better information about changes in the unit costs of inventory commodities, particularly of goods in process and finished goods, than is now provided by standard price series. At best, however, the process of computing physical volume indexes by correcting book value figures for price changes will provide only rough approximations. The more widely we are able to extend our records of stocks in physical units, the more we shall be able to substitute accurate data for crude estimates.